

AIRBORNE COMMUNICATIONS NODE

SOLICITATION

MDA972-98-R-0006

MARCH 26, 1998

TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
1.0 GENERAL INFORMATION		1
2.0 ACN TECHNICAL OBJECTIVES		4
2.1 Introduction		4
2.2 Scope		6
2.3 Architecture Implementation		7
2.4 Phase I Objectives		8
2.4.1 Phase I Testing		9
2.4.2 Notional Phase I Milestones and Deliverables		9
2.5 Phase II Objectives		12
2.5.1 Phase II Payload Testing		12
2.5.2 Notional Phase II Milestones and Deliverables		13
2.6 Program Management		15
3.0 PROPOSAL PREPARATION INSTRUCTIONS		15
3.1 General Instructions		15
3.2 Submission of Offers		16
3.3 Period for Acceptance of Offers		16
3.4 Formal Communications		16
3.5 Participation of Government Support Contractors		16
3.6 Destruction of Unsuccessful Proposals		17
3.7 Instructions for Preparation of Proposals		17
3.8 Proposal Breakout		18
3.8.1 Technical Approach		19
3.8.2 Product Capability Description		20

3.8.3 Management Processes	21
3.8.4 Cost Response	22
4.0 PROPOSAL EVALUATION PROCESS	23
4.1 Basis for Phase I Award	23
4.1.1 Technical Approach and Product Capability Description	23
4.1.2 Management Processes	24
4.1.3 Cost Response	25
4.2 Down-Selection Factors for Phase II Award	25
5.0 ORAL PRESENTATIONS	25
6.0 LATE PROPOSALS	26
7.0 REGULATIONS GOVERNING OBJECTIONS TO THE SOLICITATION AND AWARD	26

FIGURES

1	Notional Program Plan and Schedule of Events.....	7
---	---	---

TABLES

1	Response Format and Page Limitation	17
---	---	----

ATTACHMENTS

A	Airborne Communications Node Technical Thresholds and Goals	A-1
B	Model Agreement.....	B-1
C	Acronym List.....	C-1
D	Solicitation Questions and Answers	D-1

**Program Solicitation for the
Airborne Communications Node (ACN)
MDA972-98-R-0006**

NOTICE: Proposals are due by April 30, 1998 at 2:00 p.m. to:
Mail Room, 8th Floor
Attention: Ms. Robin Swatloski, Contracting Officer
Contracts Management Office
Defense Advanced Research Projects Agency
3701 North Fairfax Drive
Arlington, VA 22203-1714
(telephone number: 703-696-0081)

1.0 GENERAL INFORMATION

The Defense Advanced Research Projects Agency (DARPA) is planning the execution of a technology development and demonstration program leading to a full capability Airborne Communications Node (ACN). The ACN will provide wide-area communications services supporting enhanced information sharing within and among joint and multinational forces. It will augment mobile military communications infrastructure by providing the capability to simultaneously establish an early robust infrastructure for intratheater communications and reachback connectivity to out-of-theater sites without the need for large in-theater assets. It will feature robust gateways, bridging, routing, broadcasting, paging, multimedia services, and extensions to other aircraft through air-to-air crosslinks forming a self-organizing airborne backbone. Although the specific needs of the military user (security and robustness) should be considered, a primary goal of this program is to demonstrate the maximum extent to which modern communications services can be provided to the military at an affordable cost.

DARPA will execute this program under the authority of Section 845 of the Department of Defense (DoD) 1994 National Defense Authorization Act, as amended by Section 804 of the DoD 1997 National Defense Authorization Act. Commonly known as "Section 845" or "other transactions for prototype projects," it provides for the acquisition of prototype projects and allows considerable flexibility in the acquisition process. The objective of the ACN acquisition is to design, develop, fabricate, integrate, test and demonstrate a prototype payload deployed onboard the Global Hawk high altitude endurance unmanned aerial vehicle (HAE UAV) and a subset capability on-board a helicopter. A design to cost philosophy will be employed for the development of the demonstration systems.

The overall program objectives are to develop a set of communications services that are interoperable with currently fielded military systems; are low cost, reliable, secure and robust; are tailored to the size, weight, and power (SWAP) requirements; and have a capability to support a wide range of mobile military missions when implemented on-board a Global Hawk or other airborne platform. The ACN should employ a modular, software reprogrammable and open system architecture to support multiple communications services, to include:

- Cellular/Personal Communications Service (PCS)-like circuit-oriented voice and data;
- Paging;
- Internet-like data networking (ILDN);
- Tactical battlefield multicast;
- High speed and high throughput airborne infrastructure with access to the military communications infrastructure both in and out of theater (this access could include high data rate (HDR) line-of-sight, satellite communications (SATCOM) and crosslinks to form a self-organizing backbone;
- Surrogate satellite support for ultra-high frequency (UHF) tactical satellite (TACSAT) and Global Broadcast Service (GBS) receive/relay;
- Interoperability among dissimilar radios; and
- Range extension for over-the-horizon connectivity for dispersed, isolated and rapidly moving forces.

The ACN program will demonstrate both ground- and airborne-based elements of the system. The ground-based elements (user terminals) should be capable of operating at some reduced capability, even in the absence of the ACN (i.e., system degrades gracefully when the ACN leaves theater). Terrestrial services and/or satellite links may be included as part of the system to provide these graceful degradation characteristics. It is important to factor in a realistic operational scenario in designing the ACN services, (e.g., when the ACN is not in theater, it may be particularly important that the paging services remain available to some degree in order to disseminate high priority information, and information regarding the scheduling of future availability of the airborne node). The ACN will be capable of rapid in-flight reconfiguration of communications resources to match the evolving requirements of military operations, including pre-hostility, enroute and early entry, sustained operations and redeployment phases. The ACN needs to have the ability to provide all services in an environment where both users and nodes are mobile, and military quality of service (QoS) characteristics (e.g., precedence, priority, and assured delivery) can be employed. The ACN will enhance rapid force projection, where multiple services will support battle management of early entry expeditionary and littoral forces.

The ACN program will be executed in two phases. The first phase will commence this summer with selection of approximately three (3) teams to design and conduct a proof-of-concept demonstration of the flight and ground elements of the ACN system. The focus of the Phase I demonstration is to demonstrate the utility of system capabilities. Phase I equipment is anticipated to include commercial and nondevelopmental items with modifications to change

operating frequency (if required) or to add security and robustness features. The Government does not plan to provide any GFE in Phase I other than the demonstration aircraft and any required cryptographic equipment. In addition to the ACN Phase I performance demonstration, it is the intent of the Government to include demonstrations (simultaneous if possible) of competing Contractors' hardware in one or more major U.S. military training exercises.

Although the ultimate goal is to integrate the ACN payload on an HAE UAV, the Phase I flight demonstration will be conducted on a manned aircraft. A Government-furnished manned aircraft will be provided, however, the Contractor is free to propose using a Contractor-furnished aircraft for Phase I. For the purposes of this solicitation, assume that the Phase I Government-furnished aircraft will be a Boeing 707 or larger aircraft. (The specific aircraft will be identified during Phase I.) The Phase I flight demonstration will be conducted approximately 17 months after award. A down-selection to one team for Phase II will be conducted following the flight demonstration. Phase II is expected to be approximately 21 months in duration and conclude with a flight demonstration of a full capability prototype payload integrated on-board Global Hawk and a subset capability on-board a helicopter.

Down-selection for Phase II will be based on Phase I performance, quality of technical design, degree to which Phase II leverages and builds on Phase I development, and proposed demonstration and production costs of airborne and ground element technologies. The Phase II agreement will include the delivery of two (2) full capability airborne payloads for the Global Hawk, one payload for a helicopter, and a specified complement of ground equipment. Although the Government currently plans to procure three payloads (two full capability Global Hawk payloads and one scaled helicopter payload), a negotiated option for an additional five (5) prototype airborne payloads will be required as part of the Phase II award. Phase II aircraft for these demonstrations will be provided by the Government and specified prior to the Phase II downselection.

The Agreements for Phase I will be awarded based on a determination of best value to the Government in accordance with the evaluation factors for award. DARPA is seeking participants in this program that are capable of designing, developing, fabricating, integrating, testing and demonstrating the fundamental technologies and capabilities required to achieve the objectives of this solicitation. Contractors have the opportunity to be creative in designing the ACN and in the selection of the technical and management processes, using either commercial or DoD practices, that best suit their ACN team.

DARPA's use of the innovative type of Agreement known as an "845" or "other transactions for prototypes" reduces the traditional administrative burden and oversight required for Government contracts. This type of Agreement allows a great deal more flexibility and has far fewer regulatory requirements than a typical Federal Acquisition Regulation (FAR) contract. In particular, this initiative will not require Government cost accounting standards or Government cost audits. Furthermore, intellectual property provisions may be negotiated that differ from those usually

found in procurement contracts. The Government intends to share information and data throughout the program. This data will be advisory, not directive, in nature and will offer a way to foster better communications on the ACN program.

The Government is seeking the most capable system within the affordability goals. Contractors are expected to do the technical trade-off analyses, and tests or demonstrations when appropriate, to convince the Government that claims of technical feasibility and affordability are realistic. The most capable, affordable system may include Contractor-proposed capabilities beyond the goals listed in Attachment A and/or Contractor-proposed capabilities not called out in Attachment A. Specific affordability goals, which will be based on military utility and affordability, will be established prior to release of the Phase II solicitation.

The Government expects to fund each Agreement awarded in Phase I up to \$7.6 million. Following the down-selection process at the end of Phase I, the Government expects to fund the subsequent Agreement with approximately \$35 million, which will carry the program through completion. In addition to the Government funding, Contractor cost sharing is encouraged. Many Contractors receive Government-reimbursed funds for independent research and development (IR&D). DARPA's use of "other transactions for prototype projects" for this effort will allow the use of IR&D funds on the Contractor's share of costs (see FAR 31-205.18(e)).

Funding under this Agreement will be based on "payable milestones." These are significant, observable technical events that the Contractor and the Government agree in advance will be the basis for incremental payments making up the Government's share of expenditures. This approach tends to be fairly flexible, and milestones may be changed during the course of the project by agreement of both parties. If the cost to complete the task exceeds the amount initially agreed to, then the Contractor must either absorb the excessive costs, renegotiate, or choose, as the "other transactions for prototype projects" Agreement will permit, to discontinue the project. The amount of funds available for Phase I will not exceed the planned \$7.6 M per award.

The information provided in this program description and solicitation constitutes the Government's technical expectations, evaluation factors for award and proposal instructions. Contractors are encouraged to visit the ACN home page located on the worldwide web (WWW) at the uniform resource locator (URL) address of <<http://www.les.mil/acn>>.

2.0 ACN TECHNICAL OBJECTIVES

2.1 Introduction

The goal of the ACN program is to demonstrate enhanced communications capabilities to and among deployed and/or maneuvering forces. These new and enhanced communications services include cellular/PCS-like, paging, internet-like data networking, tactical battlefield multicast

supporting wideband data dissemination to terminals on-the-move, gateway and relay capabilities for currently fielded and new radio systems, range extension capabilities, and infrastructure augmentation via a high speed and high throughput airborne backbone. Currently fielded systems of interest include:

- Link 16,
- Enhanced Position Location and Reporting System (EPLRS),
- UHF SATCOM (5/25 kilohertz (kHz) demand assigned multiple access (DAMA)),
- Single-channel ground and airborne radio system (SINCGARS),
- Have Quick, and
- Mobile subscriber equipment (MSE) tactical wideband relay (AN/GRC-226).

The goal of the ACN is to provide robust, maintainable communications at an affordable cost. In order to maximally leverage emerging commercial technologies and to achieve affordable production, the Government is intentionally leaving many of the key system specifications to be determined by the Contractor. The Government considers military utility, acquisition cost and life-cycle cost to be key elements of this program.

It is envisioned that the ACN will augment existing communications systems in the field. A single ACN will be capable of operations in support of all units within its line-of-sight including small units and Special Forces, as well as major Corps-level ground forces. In addition, it supports communications with Naval elements and land- and sea-based aircraft. Although Global Hawk is targeted as the primary platform for the airborne component of the ACN, a helicopter-based variant is envisioned for use by Army, Navy and Marine Corps for periods when a Global Hawk platform is not in theater or available for the ACN mission.

The ACN payload for Phase II should not exceed the size, weight and power (SWAP) (including cooling) available on the target aircraft. The threshold SWAP is the SWAP available on the Global Hawk HAE UAV, which is 130 cubic feet, 900 pounds and 6,000 watts (W) (4,500 direct current (DC) and 1,500 alternating current (AC)). To enable dual payloads (i.e., SIGINT and ACN) to coexist (not necessarily operate concurrently) on a Global Hawk the SWAP goals for ACN have been set at: 100 cubic feet, 450 pounds and 5,000 watts. The goal SWAP parameters facilitate payload integration on platforms that do not have the capacity of the Global Hawk HAE UAV (e.g., Predator or a helicopter). The helicopter-based airborne ACN payload (planned for Phase II) should have an installation/removal time (except for the antennas, cabling and connectors for the antennas, and prime power) not to exceed two (2) hours. Any external antennas on the helicopter variants should either be permanently affixed or also be removable within the same two (2) hour period. The helicopter ACN payload implementation will be a demonstration of the modularity and scalability of the ACN design. Contractors will be required to propose the helicopter payload capabilities and associated PFP in their Phase II proposal.

The ACN will be controlled by the Remoteable ACN Control Element (RACE). Detailed descriptions of the RACE and the ACN communications capabilities, relays, gateways, bridging, routing and multimedia services are found in Attachment A, Airborne Communications Node Technical Thresholds and Goals.

Affordability will be measured in terms of payload flyaway price (PFP), which is defined as the Government cost to procure the payload and integrate it on-board the airborne platform -- it does not include the airframe. The Government is interested in obtaining the best value in terms of capability and PFP. Specific affordability goals, which will be based on military utility and affordability, will be established prior to release of the Phase II solicitation. During Phase I, the Contractor is asked to determine and propose the PFP for a payload design that meets all of the thresholds and as many of the technical goals (described in Attachment A) as feasible given technology, schedule, and SWAP constraints. If the Contractor recommends additional capabilities and goals beyond those included in Attachment A, they should be included in the PFP. Although there is no PFP goal in Phase I, the projected PFP will be evaluated for reasonableness and completeness as part of the source selection process. For the purposes of this solicitation, the projected PFP should be based upon the procurement of 10 ACN payloads. (This is for comparative purposes only -- it does not imply that the Government is committed to purchase 10 ACN payloads.) In conjunction with the Phase II proposal, the Contractor will be required to put forth a fixed-price, irrevocable offer for 10 units. This fixed price offer must be based on the PFP. The requirement to submit an irrevocable offer is in addition to the requirement for a negotiated option for 5 additional payloads.

The use of open systems architecture with software reprogrammable implementation is desired. This will provide the flexibility to support force reorganization scenarios and concurrent operation and reconfiguration of waveforms and protocols, and expandability to accommodate future objectives for remote software reprogramming of new waveforms and internetworking protocols. The payload should not interfere with the UAV's safety-of-flight systems and should be designed to minimize the payload's impact (including antennas and cabling) on the aircraft.

The ACN development poses several major technical challenges, including multi-level security, complex multi-system integration, integrated antenna and electromagnetic interference and electromagnetic compatibility (EMI/EMC) system development, cosite interference mitigation, development of comprehensive payload and system services' resource controllers, and development of mobile ILDN, cellular/PCS-like and paging capability. The use of miniaturization technologies is encouraged in order to achieve the full complement of desired ACN capabilities within the goal payload SWAP.

2.2 Scope

The ACN acquisition will be a two-phase, multiple award program. Phase I will consist of a full and open competition for approximately three (3) awards to conduct competitive efforts to

design, develop, integrate, test and demonstrate the functional capability of the goal ACN payload on a manned aircraft. Contractor's designs that are determined to be non-responsive in quality or timeliness may be terminated at any milestone in accordance with the termination articles. A down-selection to one Contractor/team for continuation of payload development through Phase II will occur following the Phase I flight demonstrations. Phase II will consist of the final design, development, fabrication, integration, test and demonstration of a pre-production quality (i.e., not a lab or brass-board version) prototype advanced technology payload on a Global Hawk HAE UAV and a subset capability on a helicopter. Phase III, which is beyond the scope of this acquisition, may comprise the military Services acquiring quantities of ACN equipment for use on Global Hawks or other platforms. Current Service planning includes a potential need for up to 44 Global Hawk-based ACN payloads.

A notional schedule of events for the ACN program is shown in Figure 1.

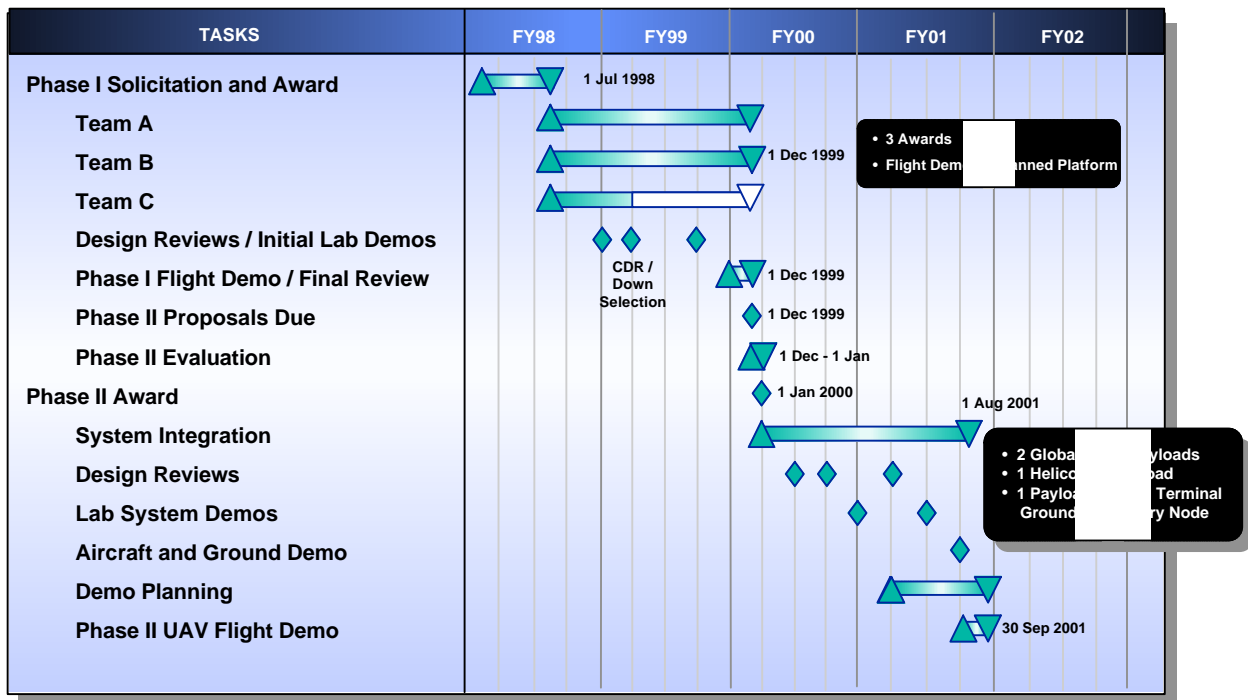


Figure 1: Notional Program Schedule

2.3 Architecture Implementation

The ACN will provide a set of communications services that, when implemented in a comprehensive package or as a subset, can satisfy many current and future military communications needs. To achieve this goal, the design of the ACN requires conformance to the programmable modular communication system (PMCS) entity reference model (ERM) and the emerging Joint Tactical Radio Subsystem (JTRS) architecture. The Government expects that the

architectural approach will be based on a set of interfaces, both functional and physical, that is described by widely used open architecture industry standards and commercial items. This expectation insures that modular hardware and software can be implemented throughout the ACN design and development. In order to accommodate current and future objectives, the architecture should possess the following qualities:

- Reprogrammable - The ACN architecture should support the ability to implement and change varying capabilities by initializing different application software modules;
- Reconfigurable - The ACN architecture should be able to adapt to changes in user and mission requirements, such as the capability to change the payload configuration during flight (i.e., channel allocations, waveforms, routing tables, etc.) to support force reorganization;
- Modular - The ACN architecture should be able to support the ability to change the system's attributes by physically changing modules (hardware and/or software), such as modules utilizing new technologies;
- Scalable - The ACN architecture should be able to support the addition or deletion of system capabilities to accommodate larger or smaller requirements, such as increasing the range or number of channels and installation of selected sets of capabilities on constrained or more capable platforms;
- Extendible - The ACN architecture should be able to accommodate the addition of new features, functions and technologies without major redesign or re-engineering.

2.4 Phase I Objectives

Phase I is expected to be completed within 17 months of award. During this phase, the objective is to complete a design study for the payload, and build and flight-test a proof-of-concept payload. The payload flight tests should demonstrate the full complement of the ACN subsystem's performance to the maximum extent possible prior to Phase II activities. The ACN system design should address the full complement of expected capabilities with special attention to the technical challenges and high risk areas. Contractors will have access to the information provided in the Final Reports of the ACN technology design and development teams prepared in 1997 for DARPA, including antenna/EMI mitigation, handheld communications, communications controller/high bandwidth transport infrastructure, and Warfighter's Internet. Contractors will also have access to information from the DARPA-funded technology efforts in advanced communications, and advanced and mobile networking.

Phase I efforts should include comprehensive proposed designs for the ACN payload, including subsystem designs, an overall plan for accomplishing the proof-of-concept flight demonstration

and approach for transitioning from Phase I implementation to Phase II implementation. Specific design guidance is outlined in Attachment A. The successful design should meet all of the ACN technical thresholds as described in Attachment A and as many of the ACN technical goals as feasible and practical. The Contractor is to perform trade-off analyses to demonstrate the feasibility and practicality of meeting ACN goals with the design. The following list summarizes the general ACN Phase I objectives:

- Develop an ACN design that satisfies the technical thresholds and goals stated in Attachment A;
- Develop ACN airborne and ground element (RACE) design that demonstrates proof-of-concept functionality;
- Conduct analyses and trade-off studies for integrating commercial and Government-developed advanced technologies;
- Conduct analyses and trade-off studies to demonstrate the feasibility and practicality of the design approach and which convey the Contractor's approach for mitigating high risk areas;
- Develop a comprehensive plan for accomplishing the tasks associated with Phase I and II; and
- Develop and conduct a proof-of-concept ground and flight demonstration of the airborne payload and RACE.

2.4.1 Phase I Testing

The Phase I test plan is to be developed and executed by the Contractor and accepted by the Government. The Contractor-prepared test plan should include EMI/EMC analysis and legacy interoperability testing. Demonstrating legacy interoperability can be accomplished using contractor-supplied legacy radios or through utilization of the U.S. Army Communications-Electronics Command's (CECOM) Digital Integrated Laboratory (DIL) resources. If required to establish flight safety, an explosive atmosphere test will be included as part of the test plan. The requirement for the explosive atmosphere test will be resolved during Phase I. The Contractor is expected to accomplish laboratory testing of the ACN equipment to demonstrate compliance with the design specification. The Government will provide an aircraft and access to a test range for flight testing.

2.4.2 Notional Phase I Milestones and Deliverables

If the Contractor believes revisions to the following notional milestones and deliverables are needed to better support this program, they should make revisions (as supported by their cost proposal) to their Agreement and discuss the rationale in the proposal (Technical Approach). Any proposed changes should maintain the same fiscal year funding allocation.

Milestone 1: Phase I Kickoff - not more than one month after award (proposed payment of \$350,000 upon successful completion of the milestone)

- Draft (updated) program plan.

Milestone 2: In Progress Review (IPR) #1 - four months after award (proposed payment of \$650,000)

- Documentation of preliminary design, including:
 - Approach to achieving modular software reprogrammable payload design compliant with PMCS ERM,
 - Approach to achieving interoperability and SWAP requirements,
 - Approach to open systems architecture,
 - Approach to achieving proposed goals,
 - Trade-off analyses providing the rationale for the selected design,
 - Analyses conveying approach for mitigating high technical risk areas and risk reduction efforts,
 - Approach to utilizing technologies now under development commercially and by DARPA,
 - Approach to obtaining spectrum supportability, and
 - Technology roadmap with clear design decision points identified;
- Detailed plan for accomplishing Phase I program plan; and
- IPR of overall program technical, fiscal, and schedule status.

Milestone 3: Phase I Critical Design Review - six months after award (proposed payment of \$600,000 upon successful completion of the milestone)

- Detailed system design including:
 - System architecture including interface definitions,
 - Implementation of proposed functional capabilities, and
 - Hardware and software description;
- Description of flexibility, expandability, scalability, reprogrammability and modularity features;

- Provide CONOPS/Military Utility Assessment
- Proposed alternative platforms to Global Hawk as a demonstration platform only; and
- IPR of overall program technical, fiscal, and schedule status.

NOTE: Optional down-selection to two contractors would occur after Milestone 3.

Milestone 4: In-Process Review #2 - nine months after Phase I Award (proposed payment of \$2,000,000)

- Update analyses and trade-off studies providing rationale for the design approach;
- Define system and subsystem architectures and interfaces;
- Update description of implementation of proposed functional capabilities;
- Define predicted payload performance;
- Provide updated hardware and software descriptions in a system specification format;
- Provide updated description of flexibility, expandability, scalability and modularity;
- Provide updates to detailed plan for accomplishing remaining tasks in Phase I and planned tasks for Phase II;
- Provide test and demonstration plan for lab test, over-the-air ground test, and flight test (first draft);
- Detailed plan for accomplishing Phase II tasks; and
- IPR of overall program technical, fiscal, and schedule status.

Milestone 5: In-Process Review #3 - twelve months after Phase I Award (proposed payment of \$1,500,000)

- Equipment acquisition and technology development status;
- Subsystem fabrication and assembly status;
- Technical risks mitigation status;

- Updated test and demonstration plan; and
- IPR of overall program technical, fiscal, and schedule status.

Milestone 6: Final Review - 15 months after Phase I Award (proposed payment of \$1,500,000)

- Complete proof-of-concept payload subsystem fabrication/assembly;
- Conduct subsystem laboratory (bench) functional and performance tests (to the extent possible);
- Finalized test and demonstration plan; and
- Flight Readiness Review (FRR).

Milestone 7: ACN proof-of-concept flight demonstration - no more than 17 months after Phase I Award (proposed payment of \$1,000,000)

- Demonstrate ACN payload operation, including simultaneous operation of multiple channels on multiple simultaneously operating communications systems;
- Conduct performance testing of the payload; and
- Submit a detailed plan and proposal for Phase II.

2.5 Phase II Objectives

Phase II is expected to commence 18 months after the Phase I award and is expected to be completed within 21 months of Phase II start. During Phase II, the Contractor will complete the final design, development, fabrication, integration, test, and demonstration of a full function pre-production quality prototype advanced technology payload on a Global Hawk HAE UAV and a subset capability on a helicopter, including a RACE. The Contractor should demonstrate and support the full complement of the ACN capabilities. The Government will specify the Phase II demonstration platforms at the end of Phase I. Field demonstrations will be conducted in accordance with a field demonstration plan to be developed by the Contractor and coordinated by the Government with interested military Services.

2.5.1 Phase II Payload Testing

The ACN payloads will be tested under laboratory and flight conditions to ensure compliance with the design description submitted (notionally) under Milestone 3. The Contractor is expected to accomplish laboratory testing to demonstrate compliance with the design specification. Interoperability testing will be performed to the extent specified in Attachment A. The Government will provide access to currently fielded system equipment to the extent that it cannot be provided or arranged by the Contractor. The Contractor is requested to make every effort to procure all systems required for test on their own, rather than relying on GFE.

The Contractor is expected to participate in a flight demonstration readiness review prior to flight testing. In preparation for this review, the Contractor should provide sufficient technical information to the Government, including the results of the laboratory acceptance testing and any other reports or documentation necessary to support flight readiness. In addition, the Contractor is expected to deliver a comprehensive flight demonstration plan. Unless otherwise specified, the flight testing will be on a Global Hawk and a helicopter. The flight demonstration phase is expected to be limited to six months and is included within the overall duration of Phase II. During this phase the Contractor is expected to provide support for ACN flight demonstration operations at one or more CONUS locations.

2.5.2 Notional Phase II Milestones and Deliverables

Milestone 1: Phase II Kickoff - not more than 1 month after Phase II award

- Updated program plan;
- Critical review of updated Phase I design approach;
- Description of developments required and describe plan and schedule for development; and
- Overall schedule for integration of all items.

Milestone 2: In-Process Review #1 - three months after Phase II award

- Updated design approach and open systems architecture approach;
- Lab demonstrations clarifying rationale for the design approach;
- Review of high risk mitigation plan; and
- Updated approach for achieving proposed goals (technical and cost).

Milestone 3: Final Design Review - six months after Phase II award

- Identify Global Hawk modification requirements to Teledyne Ryan Aeronautics (TRA);
- Define ACN payload design complying with the SWAP constraints;
- Update analyses and trade-off studies providing rationale for the design approach;
- Define system and subsystem architectures/interface, including RACE;

- Update description of implementation of proposed functional capabilities;
- Define predicted payload performance;
- Provide updated hardware and software descriptions in a system specification format;
- Provide updated description of flexibility, expandability, scalability and modularity;
- Provide updates to detailed plan for accomplishing remaining tasks in Phase II; and
- Provide test and integration plan (first draft).

Milestone 4: Lab System Demo #1 - nine months after Phase II award

- Conduct subsystem laboratory (bench) functional and performance tests (to the extent possible), to show progress in high risk areas, including, but not limited to EMI/EMC mitigation, payload control and mobile routing;
- Review overall program status; and
- Updated test and integration plan

Milestone 5: In-Process Review #2 - 12 months after Phase II award

- Review overall program status;
- Technical risks mitigation status;
- Report on integration of key technologies;
- Final system test and integration plan; and
- Initial field demonstration plan.

Milestone 6: Lab System Demo #2 - 15 months after Phase II award

- Complete payload assembly to the extent possible;
- Demonstrate ACN payload operation, including simultaneous operation of multiple channels on multiple simultaneously operating communications systems;
- Conduct performance testing of the payload to the extent possible prior to aircraft integration;
- Demonstrate ACN payload operation and control by the RACE;
- Complete payload documentation and test report; and
- Updated field demonstration and evaluation plan.

Milestone 7: Aircraft Integration/Ground Demo - 18 months after Phase II award

- Detailed ACN payload/aircraft I&T plan (developed in conjunction with TRA);
- Payload integration complete;
- Complete ACN/aircraft ground testing;
- Detailed ACN field demonstration and evaluation plan; and
- Flight readiness review.

Milestone 8 ACN Field Demonstration - 21 months after Phase II award

- Complete ACN flight testing;
- Complete ACN/aircraft I&T documentation;
- Complete ACN/aircraft field demonstrations;
- Complete ACN/aircraft field demonstration documentation and reports; and
- Complete ACN/aircraft transition plan support (Government action).

2.6 Program Management

The Contractor is expected to provide the necessary management to execute this program. This includes managing the program as well as preparing, conducting and documenting program reviews to keep the Government informed of overall program status. Each ACN Contractor is encouraged to form Integrated Product Teams (IPTs) as required. The DARPA Program Manager (PM) will select one or more Government representatives for each Contractor team to facilitate the flow of information between the Contractor and the Government during Phase I. Government participants in Contractor IPTs may be non-voting members of the source selection process for the Phase II down-selection. Phase I Contractors may also include team representatives from other Contractor organizations, such as those building communication system equipment, software-reprogrammable radios or airframes, or other Government organizations, on the IPT as they deem appropriate or necessary to meet ACN design goals. The DARPA PM desires an open and continuous dialog with the individual Contractors. The purpose of this dialog is to have insight, not oversight, into the Contractor's design activities and approaches. Therefore, the Contractor is expected to provide access for appropriate DARPA designated personnel to the documentation necessary to have visibility into the technical progress, schedule, management and financial status, and any other documentation required to execute this program. How the Government personnel on the Contractor IPTs will interact with the Contractors will be the subject of Rules of Engagement, which will be provided at time of award.

3.0 PROPOSAL PREPARATION INSTRUCTIONS

3.1 General Instructions

The instructions presented in this section have been tailored to the evaluation factors to be applied during the proposal evaluation. These instructions are designed to ensure the submission of information essential to the understanding and comprehensive evaluation of the Contractor's proposal. The overall quality of the proposal will be considered a direct indication of the Contractor's capability to comply with the solicitation requirements, including technical and managerial competence, expected quality of deliverables and cost reasonableness.

3.2 Submission of Offers

Five (5) paper copies (with one being the signed original) and two diskette copies of the proposal, to include the proposed Agreement, must be submitted to the address cited at the top of this solicitation. The proposal should be submitted using the Office 95 software suite. Offers received after the exact time specified will not be considered. Proposals submitted by facsimile or electronic mail will not be evaluated. It is anticipated that multiple awards will be made.

Research centers, universities, historical black colleges and universities (HBCU) and minority institutions (MI) are encouraged to join others in submitting proposals. However, no portion of this solicitation will be set aside for HBCU and MI participation due to the impracticality of reserving specific areas of ACN technology for exclusive competition among those entities.

3.3 Period for Acceptance of Offers

The Contractor is expected to validate the prices in its offer for 90 calendar days from the date specified for receipt of proposals.

3.4 Formal Communications

This solicitation, Question and Answer (Q&A) file, and other related documents can be found on the Internet home page <<http://www.les.mil/acn>>. Questions should be directed to Ms. Robin Swatloski, Contracting Officer, DARPA Contracts Management Directorate, 3701 North Fairfax Drive, Arlington, VA 22203, via an electronic mail message <rswatloski@darpa.mil> or by facsimile to 703-696-2208. Each question and comment must reference the solicitation number.

3.5 Participation of Government Support Contractors

Contractors are advised that employees of Space Applications Corporation (SAC), Information Sciences Laboratories Inc. (ISL), Illinois Institute of Technology Research Institute (IITRI), TRA, and The MITRE Corporation have been identified as potential technical advisors in the source selection process. These individuals have signed non-disclosure statements and will be authorized access to only those portions of the proposal data and discussions that are necessary to enable them to perform their respective duties. Such firms are expressly prohibited from competing on the subject acquisition and from proposal scoring, ranking or recommending the selection of a source. By submission of a proposal, the Contractor agrees that proposal information may be disclosed to those selected individuals for the limited purpose stated above. Any information not intended for limited release to these individuals must be clearly marked and submitted segregated from other proposal material.

3.6 Destruction of Unsuccessful Proposals

All unsuccessful proposals will be destroyed three (3) months after award. No destruction certification will be furnished.

3.7 Instructions for Preparation of Proposals

Each proposal should address three general areas: (1) technical approach and product capability, (2) management processes (including personnel qualifications and past performance) and (3) cost.

The proposal should not exceed 100 pages, including all appendices, attachments, figures and tables. The Cost Response, Model Agreement, and Acronym List do not count against the page limits shown in Table 1. Contractors are encouraged to provide the necessary information in the fewest pages required to demonstrate their effort. Material exceeding the page limitation will not be evaluated. All proposals will be unclassified. Should submittal of classified information be required, the Contractor should contact the contracting officer (CO) for instructions.

Contractors should submit a completed Agreement, ready to be signed, using the Model Agreement (Attachment B) as a guide. Contractor's response to the terms and conditions are critical in the construction of the proposal and in the evaluation process. In addition, the contractor should propose any changes, additions, or deletions to the Model Agreement that should be considered during negotiations, and should fully explain the rationale for the changes made in an addendum to the Agreement.

Five (5) copies of proposals will be submitted in loose-leaf form and tabbed to indicate section changes. Pages will be single-spaced, single-sided and justified on 8.5 by 11 inch paper. Foldouts on 11 by 17 inch paper are permitted for the presentation of non-textual information. Contractors will use a 12 point or larger type font for textual material, including footnotes. All pages will be numbered consecutively. The Contractor should use a uniform paragraph numbering system; each paragraph and subparagraph should have a separate identifier. Condensed printing, small type faces, slight margins, highly reduced figures, etc., are unacceptable.

Sections of Proposal	Notional Page Recommendation
Table of Contents	No Limitation
Executive Summary	5
Technical Approach	35
Product Capability Description	35
Management	25
Cost Response	No Limitation
Model Agreement	No Limitation

Acronym List	No Limitation
--------------	---------------

Table 1: Response Format and Page Limitation

Legible graphics (e.g., figures, tables, charts, etc.) should be used where appropriate and practical to depict organizations, processes, system descriptions and designs, implementation schedules, plans, etc.

Electronic proposal submissions will be in Microsoft Office 95, uncompressed files submitted on iomega zip drive PC-formatted diskettes. Layout of the proposal text in graphics (such as Text Art, Text Box, etc.) or columns (such as newspaper, balanced newspaper, parallel, etc.) is not permitted.

3.8 Proposal Breakout

The Contractor is expected to present the proposed technical and management approach for accomplishing the work required by the solicitation. Each response should be keyed to the respective Solicitation paragraph and include a description of how the requirement will be satisfied in enough detail to allow evaluators to determine that the requirements will be met or exceeded. The following general guidelines are provided for the development of proposals.

- The proposal should include a cover page with the title of the proposal, the name and address of the proposing organization (including each participant of a multiple-entry team), and the name, title, telephone numbers and electronic mail addresses, if any, of technical and administrative contacts. An official letter of submission, signed by a corporate officer having the authority to commit the company, should follow the cover page.
- The Contractor is expected to demonstrate a clear understanding of the thresholds and goals and to substantiate the soundness of the proposed approach. Any risks associated with satisfying the thresholds and goals should be identified, and the likelihood that the proposed approach will succeed in the presence of those risks should be demonstrated.
- The proposal should include specific references to substantiating documentation. Appropriate technical documentation used as references may be delivered along with the proposal. It is the Contractor's responsibility to assure that all documentation needed by the evaluation team to thoroughly understand and evaluate the proposal is available. This documentation may be provided as a part of the proposal, and will be included in the page limitation.

3.8.1 Technical Approach

The technical proposal should provide a preliminary description of the technical approach to be used in delivering the proposed design and demonstration for both Phase I and Phase II. In all cases the detail provided for proposed Phase I efforts is expected to be greater than that provided for anticipated Phase II efforts, however, it is important to clearly articulate the relationship (if any) between Phase I and Phase II activities, and fully explain those activities that are independent, and why. Specifically, the technical approach section should include the following:

- Describe the technologies, architecture, interfaces, standards, and methods or techniques to be used in the proposed design. The Contractor should describe how the proposed design meets the technical goals; supports open systems architecture, modularity, flexibility, scalability, expandability; and makes use of advanced technologies, (e.g., commercial items, Government off-the-shelf (GOTS)/developed advanced technology and/or emerging industry capabilities). Include a projected PFP for the design.
- The proposal should discuss any innovative claims, should identify key technical ideas to be pursued and should describe the expected impact on the state of the art and benefits to end users. This should include the technical rationale substantiating claims made, a description and justification of proposed work and a comparison with alternative approaches.
- The Contractor should discuss how the proposed design will be developed, built, integrated, tested and demonstrated. This section should describe how technical skills and physical resources, such as laboratories, manufacturing and test facilities, and other resources, will be used to assure the successful completion of the Phase I and Phase II deliverables.
- The technical proposal should identify and discuss in detail the tests and demonstrations to be performed, including laboratory tests, the proof-of-concept demonstration at the end of Phase I and the flight demonstration in Phase II. The proposal should provide a detailed plan for the design and execution of the proof-of-concept demonstration activities in Phase I. The proposal should also provide a proposed approach for the development, testing and flight demonstration activities associated with Phase II.
- The Contractor should present their overall hardware design and provide estimates of the Phase I SWAP. The design description should include the proposed Phase I mounting approach and equipment layout.

- The proposal should include the expected results from the design effort, and the form in which the results will be available to influence the research, development and practice of other efforts, including Phase II. This should describe how the expected results could be integrated with solutions other Contractors are likely to develop, so as to facilitate systematic approaches to additional capabilities and applications (i.e., JTRS, other platforms, etc.). The Contractor should provide a summary of any proprietary claims of results, prototypes or systems, or a statement of no proprietary claims. Contractors are advised to read Article VIII (Patent Rights) and Article IX (Data Rights) of the Model Agreement (Attachment C).

3.8.2 Product Capability Description

The proposal is expected to include a detailed description of the proposed design in terms of its features, functions and capabilities, and how these capabilities will be achieved. In general, the product capability description should describe what the proposed design will do and how it does it. Specifically, this section should include the following information:

- Describe the proposed design and how it will satisfy the interoperability and SWAP requirements. The proposal should include a preliminary description of the proposed airborne and ground element (RACE) designs and how they will be implemented in the Phase I platform, the Phase II Global Hawk and the helicopter versions and the respective control elements. Include details of additional ground equipment necessary to support ACN services if different from currently fielded military or commercial systems. Include descriptions of how interoperability will be supported and with which systems.
- Describe how the design supports flexibility, expandability, scalability and modularity.
- Include a risk assessment of any technical barriers to be overcome, and describe the technical developments which will surmount those barriers and the basis for confidence that those developments are feasible.
- Include a discussion of any thresholds or goals that will not be included in either the Phase I or the Phase II design, and the reason for their exclusion (e.g., cost, limits of technology, etc.).
- Determine the PFP. Include any assumptions and conditions necessary for meeting the PFP. Describe what model will be used to consider impact to PFP when conducting design trades.

3.8.3 Management Processes

The proposal is expected to include a discussion of the management processes that describes how proposed personnel, organizational structure and management procedures will provide the overall program control and expertise to meet expectations and goals. It should address the coordination and tracking of program progress, schedule and expenditures, including a discussion of the documentation to be made available to the Government and the Government's visibility into the Contractor's development processes and progress. The proposal should also address subcontracting and teaming arrangements, lines of authority, areas of responsibility, assigned task areas and the rationale for teaming selection. The following additional guidance is provided:

- Describe the proposed schedule, observable technical accomplishments, deliverables and payable milestones. This should include performance metrics indicating how the development would be evaluated objectively. A summary of the deliverables is expected to include substantive explanatory information (e.g., prototype hardware or software designs, algorithms, or performance data).
- Provide a list of key personnel (e.g., lead or senior engineers, and program managers) and estimated level of effort in staff months for each task and phase of contract performance. Provide a concise summary of qualifications of key personnel, including resumes. Each resume submitted must be validated by the signature of the individual and an officer of the company.
- Describe how software productivity will be defined, measured and reported.
- Provide a list of related projects and proposals pending award to which key personnel are assigned or proposed, and a discussion of how the Contractor will be able to meet proposed personnel commitments and satisfy all clients.
- The proposal also should convey evidence that the Contractor, or the Contractor's team, has the capability to perform all phases of the ACN program, including any potential follow-on production activities.
- Contractors should submit a description of their past performance, within the past 5 years, relevant to the ACN program. Past performance information can include both Government and commercial contract information. A past performance risk analysis will be performed based on the Offeror provided data and data from other Government sources. Relevant data may include work performed by other divisions, corporate management, critical subcontractors or teaming subcontractors if these resources will be used on the ACN agreement. The following data from current and past contracts should be included:

(1) Company/Division name, (2) Program title as listed on the contract, (3) Government PM/Government Technical POC, (4) Contracting agency, (5) Contract number, (6) A brief description of the contract effort, (7) Type of contract, (8) Period of performance, (9) Original contract dollar value and current/final contract dollar value, (10) Original completion date and current/final completion date, and name, address and telephone number of the customer's program manager, contracting officer, and chief engineer. Offerors are expected to explain what aspects of the contracts are relevant to the ACN program in terms of achieving the desired product performance, cost and schedule performance, and risk reduction efforts. Offerors can also submit information on significant achievements or explain past performance problems that have been overcome. The past performance section of the proposal will not become a part of the agreement.

- The Contractor should address its proposed IPT structure and management, including processes, procedures, membership, and decision-making, etc. The Contractor is expected to initiate a CONOPS/military utility IPT during Phase I.

3.8.4 Cost Response

The cost proposal defines labor necessary to do the job, and any cost share (by amount and type). The cost response is expected to include, at a minimum, the information necessary to determine the reasonableness of cost. The cost response will be in the Contractor's format and address Phase I.

DARPA anticipates funding each Agreement up to \$7.6 million during Phase I. Certified cost or pricing data is not required; however, in order to determine the reasonableness, realism and completeness of the cost proposal, the following should be provided:

- Labor: Total labor includes direct labor and all indirect expenses associated with labor to be used on Phase I of the ACN Program. Provide a breakdown of labor and rates for each major category of personnel to be used during Phase I.
- Direct Materials: Total direct materials include materials that will be acquired and/or consumed in the performance of Phase I. Limit this information to major items of material and how the estimated expense was derived.
- Team Members or Subcontracts: Describe major efforts of team members or subcontractors, specifying the source, estimated cost and the basis for the estimate.
- Travel: Total proposed travel expenditures relating to Phase I. Limit this information to the number of trips and purpose of each.

- Other Costs: Direct costs not included above. List the item, estimated cost and the basis for the estimate.
- Government-Provided Resources: The Government may provide equipment, technical assistance or services as part of the project. Examples of this include engineering advice and the use of Government equipment during demonstrations. Do not include the internal Government costs of these resources in cost calculations. In those cases where there is an exchange of funds, i.e., if the Contractor has to pay for the use of a Government test facility, those funds will be included in the cost response. For the purposes of bidding any legacy interoperability testing reliant on the CECOM DIL (or other GFE facilities), the Contractor shall assume no extra costs associated with DIL testing other than that necessary to transport and support men and material to and from the GFE facility for the duration of the required testing. Any costs resulting from Contractor testing in lieu of GFE facilities shall be clearly identified in the proposal
- Cost Share: If proposed.

4.0 PROPOSAL EVALUATION PROCESS

All proposals received by the prescribed time and in the proper format will be reviewed and evaluated. The proposals will be evaluated solely on their general merit, compliance with program requirements and other factors. The specific areas of evaluation are technical approach and product capability, management processes (including personnel qualifications and past performance) and cost. These areas are not equally ranked. The Government reserves the right to award without discussions.

4.1 Basis for Phase I Award

There are three specific areas of evaluation that will be used: technical approach and product capability, management process, and cost. For Phase I, the technical approach and product capability is approximately twice as important as management processes (including personnel qualifications and past performance). The cost response is less important than either the technical approach or the management processes. The evaluation factors and subfactors applicable to performance in Phase I are as follows.

4.1.1 Technical Approach and Product Capability Description

The following factors will be used to review and evaluate the technical approach and product capability description:

- The degree to which the technical approach demonstrates the potential to meet the technical goals for the ACN program;
- The degree of innovation and ingenuity in the application of technologies, architecture, interfaces, standards, and methods or techniques;
- The reasonableness of proposed development, construction, testing, demonstration and prototype manufacturing approaches;
- Whether the technical approach description achieves the technical thresholds described in Attachment A;
- The degree to which the technical approach achieves some or all of the flexibility, expandability, scalability, modularity and service goals described in Attachment A; and
- The reasonableness and completeness of the proposed PFP.

4.1.2 Management Processes

The following factors will be used to review and evaluate the management processes:

- Management Processes
 - Degree to which the management approach demonstrates the potential to meet the technical goals,
 - Proposed management of the Contractor's IPT, teaming arrangements and associated contracts,
 - Demonstrated capability to track and manage program progress, schedule and expenditures,
 - Accurate and timely documentation that allows the Government to monitor all aspects of the program,
 - Risk mitigation processes, and
 - Degree to which the management approach demonstrates the potential to meet the projected PFP;
- Qualified Personnel
 - Specific related experience in the technology areas,
 - Related IR&D efforts, and
 - Experience in developing airborne electronics or communications links; and
- Past Performance
 - Projects of similar relevant scope, technology, complexity and size, and

- Demonstrated accomplishments, lessons learned, and the technical and cost trade-offs made in the execution of recent or ongoing projects using similar technologies.

4.1.3 Cost Response

The cost review will focus on the Contractor's realism, reasonableness and completeness of the Phase I costs. An area of consideration will be the extent to which the amount of effort proposed for Phase I correlates to the proposed cost in such a way to ensure the Government is receiving adequate value, and the degree of cost sharing proposed by the Contractor.

4.2 Down-Selection Factors for Phase II Award

Near the end of Phase I, the Government will solicit detailed proposals from Phase I Contractors for work to be accomplished in Phase II. The Government will review and evaluate the Phase II proposals using the down-selection factors outlined below to determine which Phase I Contractor will receive the award for Phase II. This award will be made by Agreement modification. While the down-selection factors are subject to change, the Government will endeavor to inform Contractors selected for award of Phase I of any planned changes as early as possible.

The down-selection factors to be considered in selecting the Phase II Contractor include all of the factors in the Phase I proposal evaluation, plus the following additional factors:

- Contractor performance during Phase I, considering the timeliness and quality of the deliverables;
- Identification and minimization of risk areas;
- Approach and cost to provide demonstrations and production for airborne and ground elements, including configurations for alternative platforms;
- Amount of goal capability provided for the PFP;
- Degree to which Phase II leverages and builds on Phase I development; and
- Degree of adherence to anticipated JTRS open systems architecture.

5.0 ORAL PRESENTATIONS

The Government does not intend to conduct oral presentations during the Phase I solicitation.

6.0 LATE PROPOSALS

No proposal received after the stated date and time will be considered unless:

- It was sent by registered or certified mail on or before April 24, 1998 or by U. S. Postal Service Express Mail Next Day Service - Post Office to Addressee on or before 3:00 p.m. at the address of mailing on April 26, 1998 or
- It was sent by mail and its late receipt is determined by the DARPA CO to be due solely to mishandling by the Government after receipt at the address specified in this solicitation.

The only acceptable evidence to establish the mailing date of a late proposal or modification sent either by express, registered, or certified mail is the U. S. Postal Service postmark both on the original receipt and the envelope or wrapper. All postmarks must show a legible date or the proposal will be processed as if mailed late. Proposals sent using private express services must be received by the deadline.

7.0 REGULATIONS GOVERNING OBJECTIONS TO THE SOLICITATION AND AWARD

Any objections to the terms of this solicitation must be presented in writing within fifteen (15) calendar days of the release of this solicitation. Any objections to the receipt or evaluation of proposals, or to the award of agreements under this solicitation must be presented in writing within fifteen (15) calendar days of the date the objector knows or should have known the basis for its objection. Objections must be provided in letter format, must clearly state that it is an objection to this solicitation or to the receipt or evaluation of proposals, or to the award of agreements, and provide a clearly detailed factual statement of the basis for objection. Failure to comply with these directions is a basis for summary dismissal of the objection. Objections must be mailed to the Agreements Officer, Robin M. Swatloski, DARPA/CMO.

All objections will be reviewed and referred to the Deputy Director, Office of Management Operations for a decision. If circumstances are deemed to warrant, appropriate relief will be granted.